Chapter 5.1 GROUND WATER PROTECTION PROGRAMS

The 1990 Census estimated that 1.4 million Virginians depended on ground water as the sole supply for their domestic water. Approximately 8 out of every 10 Virginians use ground water from public water supplies, private wells or springs for at least part of their daily water supply. While Virginia's ground water is generally of good quality, both the quality and quantity can vary across the five physiographic provinces found in the state.

General ground water quality information by physiographic province:

Cumberland Plateau
Geology: Sedimentary rock yielding ground water of varying quality
Pollution Potential: Moderate

The Cumberland Plateau province, encompassing the Southwestern tip of Virginia, is underlain by sedimentary rocks, principally sandstone, shale, and coal. Ground water quality here varies with depth. The first 100 feet of rock below stream level is often of poor quality, tending to be sulfurous and iron-rich, and naturally saline waters occur at depths greater than 300 feet. Better quality water can be found at depths of 150 to 300 feet below stream level, however. In coal mining areas, some ground water has become acidic due to mine drainage and is usually unsuitable for most uses.

Valley & Ridge
Geology: Sedimentary rocks including limestone, dolomite, and shale
Pollution Potential: High in limestone areas, where ground moves rapidly

Consolidated sedimentary rocks deposited beneath ancient seas underlie the Valley and Ridge Province to the west of the Blue Ridge. In the lowlands, such as the Shenandoah Valley, limestone and dolomite occur beneath the surface forming the most productive aquifers in Virginia's consolidated rock formations. In contrast, sandstone and shale are the rock types often present in the ridges and upland areas, which yield only enough water for rural and domestic supplies.

The connection between ground water and surface water plays a major role in ground water recharge in the Valley and Ridge, where streams often cross fault zones recharging aquifers. Wells in the fault zones have the greatest yields. Recharge also occurs through surface run-off into limestone sinkholes, bypassing filtration through the soil. This can cause serious water quality problems since polluted surface water may be introduced directly into the ground water system. Ground water quality can also be adversely affected by private trash dumps located in sinkholes that receive surface run-off. In addition, carbonate formations contribute to the "hardness" of the ground water.

The karst limestone type of terrain in the valley poses difficult problems for wellhead protection area delineation since underground conduits may act much like surface rivers. Some studies have suggested that surface water drainage patterns may be the best way to delineate wellhead protection areas in such circumstances.

Blue Ridge
Geology: Impervious rock. Well yields are low
Pollution Potential: High, because of rapid movement of water in cracks and fissures

The Blue Ridge Province is a relatively narrow zone to the west of the Piedmont, from 4 to 25 miles wide, with mountains of some of the highest elevations in the state. Beneath a thin layer of soil and weathered rock lies the bedrock, a relatively impervious zone containing water primarily in joints, fractures, and faults. On the eastern flank of the Blue Ridge, igneous and metamorphic rocks are most common; sedimentary rocks are more common on the western flank. Steep terrain and thin soil covering result in rapid surface run-off and low ground water recharge.

There has been little residential or industrial development in the Blue Ridge itself, so ground water use has been mainly for domestic needs rather than for public wells. The lower slopes of the mountains are the most favorable areas for ground water accumulation. Springs are common and are often used for private water supplies. Because the rocks in the Blue Ridge are relatively insoluble, the ground water is not severely mineralized, but iron content is high in some locations.

Piedmont
Geology: Diverse geology with a wide range of ground water quality and availability
Pollution Potential: Low to moderate

The largest physiographic province in Virginia is the Piedmont, extending from the fall line on the east to the Blue Ridge Mountains in the center of the state. Hard, crystalline igneous and metamorphic formations dominate this region with some areas of sedimentary rocks, with saprolite deposits overlying the bedrock. The size and number of fractures and faults in the bedrock which store and transmit ground water decrease with depth, so most significant water supplies are found within a few hundred feet of the surface. Fairly large yields of water can be obtained where fracture and fault systems are extensive, as in the Western Piedmont along the base of the Blue Ridge Mountains.

The diversity of the subsurface geology of the Piedmont Province results in wide variations in ground water quality and well yields, with ground water use at many locations limited. A few areas, for example, have problems with high iron concentrations and acidity. Because of the range in ground water quality and quantity in this region, as well as the subsequent varying potential for contamination, well site evaluation and well monitoring is very important here. From a wellhead protection standpoint, assumptions about the porosity/permeability of the overlying saprolite may have to be made so that reasonable estimates of wellhead protection areas can be calculated.

Coastal Plain
Geology: Unconsolidated sand, clay, marl, and shell strata. Groundwater is abundant and use is high.
Pollution Potential: High, due to geology and population density

The Coastal Plain in Virginia extends inland from the coast about 110 miles to the fall line and passes roughly through Fairfax County, Fredericksburg, Richmond, Petersburg, and Emporia. The Eastern Shore is part of this region and the two counties there have been conducting studies for several years to develop a more detailed understanding of their ground water situation. The Coastal Plain region is the only one in Virginia that is composed mostly of unconsolidated deposits, primarily alternating layers of sand, gravel, shell rock, silt, and clay. More ground water is stored in these very permeable materials than in any other province in the state. The pollution potential in the uppermost unconfined aquifer here is high, however, because of the permeability coupled with the high population density and agricultural activities in the area.

A large portion of the state's ground water use occurs in the Coastal Plain, which has two separate ground water systems, one shallow and one deep. In many places, a shallow unconfined aquifer system lies above relatively impermeable clay beds and is the source of water for hundreds of domestic and other small capacity wells. The principal source of major ground water withdrawals is a deeper system of confined aquifers. The recharge area to these aquifers occurs miles away where the formations outcrop but infiltration from the water table and shallower confined aquifer also recharge the deeper confined aquifers and could carry pollutants into these deeper reaches. The coastal plain presents a complex wellhead protection problem where the deep confined aquifers are concerned. The shallower aquifer, however, may have a more direct interaction with the surface and present a relatively straightforward challenge.

Except for areas where saltwater, iron, and hydrogen sulfide occur, the natural water quality in the Coastal Plain aquifers is good. In aquifers near a salt water interface, salt water may migrate west as aquifers are pumped. As a result, water from the deep aquifers on much of the lower York-James Peninsula and the Norfolk-Virginia Beach area generally contains high chloride concentrations, rendering the water too salty for domestic use without treatment.

Ground water programs in Virginia strive to maintain existing high quality water through adopted statutes, regulations, and policies. Advancing ground water protection efforts is the goal of many state programs in numerous state agencies. In late 1986, an interagency committee was formed to stimulate, strengthen, and coordinate ground water protection activities in Virginia. The Ground Water Protection Steering Committee (GWPSC) continues to meet bi-monthly with representation from the following agencies:

Department of Environmental Quality (DEQ)
Department of Health (VDH)
Chesapeake Bay Local Assistance Department (CBLAD)
Department of Mines, Minerals, and Energy (DMME)

Virginia Polytechnic and State University (VPI&SU)
Department of Housing and Community Development (VDH&CD)
Department of Agriculture and Consumer Services (VDACS)
Department of Conservation and Recreation (DCR)
Department of General Services, Division of Consolidated Laboratories (DCLS)
Department of Business Assistance (DBA)
US Geological Survey (USGS)

The following paragraphs briefly describe ground water protection activities at member agencies. Information provided in Tables 5.1-1, 5.1-2, 5.1-3 and 5.1-4 is presented for the Commonwealth as a whole. Budgetary constraints within the Commonwealth prevent coordinated data collection activities designed to characterize ambient ground water quality and changes to that quality over time on a statistically valid statewide basis.

Source Water and Wellhead Protection Efforts

Building grassroots support for ground water and wellhead protection continue to be priorities of the GWPSC and its member agencies. VDH met their obligations for source water assessments as outlined in the 1996 Amendments to the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA). These assessments offer a reasonable starting point for protection activities. In the fall of 2004, DEQ completed a Wellhead Protection Plan for the Commonwealth and submitted it to EPA for approval. DEQ elected to move forward with the submittal of an EPA approved wellhead protection program with the expectation of leveraging funds from the SDWA to assist localities in implementation of local plans. The plan received EPA approval in May 2005. VDH and DEQ are cooperating on a new program that offers competitive grants to local governments with ground water based public water supplies. The funding sources are the Clean Water Act Section 106 Ground Water Protection Grant and the Safe Drinking Water Act Drinking Water State Revolving Fund Set-Asides. Additional information can be found at http://www.deq.virginia.gov/gwpsc/whp.html including information on funding opportunities.

Table 5.1-1 Public Water Supply Systems and Population Served from Virginia's Source Water Assessment and Protection Reporting (as of Oct 19, 2005)

Total Number of Public Water Supply (PWS) systems	3,091
Total Number of GW-Dependent PWS Systems	2,767
Total Number of Community Water Supply Systems	1,243
Total Number of GW-Dependent Community Water Supply Systems	929
Total Population Relying on Community Water Supply Systems	6,258,076
Total Population Relying on GW-Dependent Community Water Supply Systems	493,478
Total Number of GW-Dependent Non-Transient Non-Community PWS Systems	590
Total Number of GW-Dependent Transient Non-Community PWS Systems	1,248

Ground Water Management Act of 1992

The 1992 session of the Virginia General Assembly adopted the Act and repealed the Ground Water Act of 1973. The Act establishes criteria for the creation of ground water management areas and requires person who withdraw more than 300,000 gallons of ground water per month to obtain permits. The Act requires that previously exempted agricultural ground water withdrawals obtain ground water withdrawal permits. The DEQ adopted regulations to implement the Act effective September 23, 1993 and amended January 1, 1999. This regulation includes specific requirements for agricultural ground water withdrawal permits and requires DEQ to perform technical evaluations of proposed withdrawals.

Storage Tank Compliance Program

The Registration Program tracks ownership and technical information for 14,500 owners of 86,500 USTs and ASTs at 28,000 facilities in the Commonwealth. Each year the Program receives over 2,000 registrations that report new tanks, tank closures, and amendments to existing tank information, such as changes of ownership. DEQ and the public use registration information to determine the identity of persons responsible for pollution prevention measures and cleanup of releases.

The AST Compliance Program regulates AST facilities of 25,000 gallons or greater that store oil. Nearly 1.5 billion gallons of oil are stored in the 2,800 regulated AST facilities across the Commonwealth. Through facility inspections, the Program seeks to ensure that Virginia's AST facilities have measures in place to prevent releases and to respond quickly and effectively when releases occur.

The UST Compliance Program regulates USTs larger than 110 gallons that contain regulated substances, which include most petroleum products. Nearly 350 million gallons of regulated substances are stored in the 25,500 active USTs across the Commonwealth. Through tank inspections, the Program seeks to ensure that USTs in the Commonwealth have measures in place to prevent releases and to have immediate notice of actual releases.

On August 8, 2005, President Bush signed H.R. 6, the Domenici-Barton Energy Policy Act of 2005. In Title 15 of the Act are amendments to Subtitle I of the Solid Waste Disposal Act addressing the regulation of underground storage tanks (primarily petroleum). Over the next few years, the new legislation requires increased inspection frequency, operator training, fuel oxygenate remediation, delivery prohibition to noncompliant tanks, and either secondary containment for tank systems or installer/manufacturer financial responsibility.

Existing State Water Control Law (§62.1-44.34:9(2) & (8)) requires DEQ to carry out its powers and duties with regard to underground storage tanks in accordance with applicable federal laws and regulations.

Storage Tank Remediation Program

The Remediation Program directs the investigation and cleanup of the petroleum contaminated sites managed by responsible parties. The DEQ ensures that appropriate emergency response, initial abatement measures, site investigation and site remediation are performed by the responsible party. The DEQ also authorizes activities eligible for reimbursement from the Virginia Petroleum Storage Tank Fund.

The DEQ will itself conduct investigation and cleanup of high-priority petroleum contaminated sites in instances where the responsible party is unknown or financially unable to undertake the required work. Through a number of contractors, the DEQ conducts emergency response, initial abatement measures, site investigation and site remediation.

The DEQ also provides immediate, interim, and permanent relief to individuals whose drinking water wells have been rendered unusable by petroleum contamination. Through a DEQ contractor, carbon filtration units (CFUs) are installed and maintained on contaminated wells until a permanent solution is implemented. Permanent solutions typically include extension of an existing public water supply or installation of a new well free from petroleum contamination.

More than 8,300 site cleanups were completed from January 2000 though December 2004. Average cleanup time and average cleanup costs per site are among the lowest in the nation.

Waste Permitting Activities

The Resource Conservation and Recovery Act (RCRA) Base Program addresses groundwater quality issues at both permitted and unpermitted facilities that have land-based units. Information provided in Table 5.1-4 RCRA Corrective Action category is for Hazardous and Solid Waste Amendment (HWSA) sites and is divided into two sectors: permitted facilities and unpermitted facilities. The term "sites" refers to facilities and most facilities have more than one waste-management unit. There are a total of 47 units among the 36 facilities. The "Base Program Correction Action" sites or "Little C" sites are permitted facilities required to perform corrective action (RUCA) if the ground water concentrations exceed established Ground Water Protection Standards. The second sector is "Unpermitted Land Disposal Facilities (LDF)" where continued operation of the facility is contingent upon removal or decontamination of contaminated media (closure) or

where RCRA Corrective Action is being undertaken under an Order or agreement with EPA. In instances where the LDF is closed, groundwater monitoring is required to demonstrate that closure performance standards are met. When standards are not met, the site is issued a Post Closure Permit and corrective action is undertaken.

Office of Remediation Programs

Included in Table 5.1-4 are ground water contamination statistics from the DEQ's Office of Remediation Programs (ORP). ORP consists of the Federal Facilities Restoration Program, Superfund Program, Voluntary Remediation Program, Site Assessment Program, and the Brownfields Program. The Federal Facilities Restoration activities include Department of Defense (DOD) installations (Army, Navy, Air Force, Defense Logistics Agency, and Formerly Used Defense Sites) and two NASA installations for a total of 58 installations. Currently 13 Federal Facilities are listed on the National Priority List (NPL) and there are 45 non-NPL sites. Base Realignment and Closure is occurring or has occurred at eight facilities. Federal funding from the Department of Defense supports the Federal Facilities Restoration program. The Superfund Program, funded with both Federal and State dollars, carries out activities required by law or legal agreements at 21 NPL sites. Four of these sites have now been cleaned up and delisted. The Voluntary Remediation Program (VRP) provides a mechanism for eligible participants to voluntarily clean up properties not mandated for remediation under existing environmental laws. This program serves as a mechanism for cleanup of Brownfields sites. There are currently 259 VRP sites that are potential candidates for clean up, formally in the program, or have been cleaned up under the program. EPA funding supports the Voluntary Remediation Program. The Site Assessment Program (SAP), supported by EPA, is currently under development and is designed to assess potential CERCLA sites for inclusion on the NPL. The DEQ's Brownfields Program, also supported by EPA, provides incentives to owners and/or developers of potential brownfield sites to promote the redevelopment and reuse of these underutilized properties. The Brownfields program has assisted with the successful redevelopment of over 50 sites in Virginia in the last three years. None of these five programs currently collect ground water quality data; however, they do receive and review data collected by outside sources. Once fully established, the SAP will collect groundwater information at potential hazardous sites via sampling of wells as well as direct push technologies.

Pesticide Disposal Program

The VDACS, in cooperation with the Virginia Pesticide Control Board, has conducted a highly popular and successful Pesticide Disposal Program since 1990. Since the Program's inception, more than one million pounds of unwanted pesticides have been collected from agricultural producers, pesticide dealers and commercial pest control firms.

To administer the Program, Virginia is subdivided into five regions. A pesticide disposal program is conducted annually in localities within one of the regions. Once all five regions have been served, the program will start another cycle. The Pesticide Disposal Program requires participants to transport their unwanted agricultural and commercial pesticides to a central collection site where the hazardous waste disposal contractor will package the pesticides for eventual disposal. If a participant cannot safely containerize the unwanted pesticides for transport, the disposal contractor will make such arrangements.

The pesticide disposal program has benefited from a high level of interagency cooperation among the VDACS, DEQ, DCR, DCLS, and Virginia Cooperative Extension. Funding to support this program has been pooled from Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Clean Water Act (Sections 319 Non Point Source and 106 Ground Water Protection) grants and the Office of Pesticide Services program fees.

Pesticides and Ground Water Management Plan

In 2006, VDACS shall seek to implement a cooperative program with other agencies including the Virginia Department of Health, the Virginia Department of Environmental Quality's Water Control Board and the Virginia Department of Game and Inland Fisheries, to develop a multi-agency plan, and related procedures, which will focus on the stewardship of pesticides applied in, or around, ponds, lakes, streams and rivers in Virginia. Participating agencies shall clarify their respective responsibilities regarding this particular use of pesticides, and shall develop a standard procedure to address recurring issues of common interest. This procedure will be communicated and made available to all concerned parties associated with these applications.

Karst Program

The project is implemented by the Natural Areas Management Program in order to document, conserve, and restore karst waters that serve both as water supplies for human use and as ground water habitats of rare, sensitive species. Project implementation is shared with the Nonpoint Source Management program, an arrangement that highlights the integral connection between the preservation of natural heritage resources and the quality of State Waters and drinking water supplies. Staff focuses on threats to water quality in a 26-county region underlain by cavernous bedrock in western Virginia, and works in close cooperation with the Virginia Cave Board, the Virginia Resource Use Education Council, the US Fish and Wildlife Service, the Department of Game and Inland Fisheries, the Department of Transportation, Soil and Water Conservation Districts, the US Geological Survey, and the Natural Area Preserve System. The three components of karst groundwater protection are education and outreach, data development, and technical assistance. Education and outreach efforts focus on stakeholder workshops, teacher education (Project Underground), and other professional development. Data development activities include basin delineation and characterization through tracer dye studies, mapping of karst features, water quality monitoring, and biological inventory. Technical assistance efforts include environmental project review and assistance to agencies and localities on development of best management practices, ordinances, and regulations. Karst Program staff serves as “on call” karst experts to localities and state and federal agencies.

Current projects of interest include the development of conservation site boundaries for Virginias approximately 400 significant caves. This project will dramatically increase the number of karst basins defined by tracer dye studies. An outgrowth of this project is the Virginia Karst Hydrology Atlas, a GIS database of tracer dye studies showing subsurface water connections in Virginia’s karst regions. The atlas will soon be available in limited form online. Full access will require coordination with Karst Program staff. Staff is also working with the Department of Game and Inland Fisheries to perform detailed inventory of the Shenandoah Valley to determine the distribution of the Madison Cave Isopod (Antrolana lira), listed as threatened over its entire range by the US Fish and Wildlife Service. Results of such a study would likely point to revisions of the species' recovery plan to require a higher base level of water quality protection measures over the entire species range rather than just at specific localities as is now the case.

The karst program is assisting Virginia Tech and VA DEQ on hydrological studies of karst groundwater systems feeding streams on the impaired stream (303d) list. Karst education received a boost this year with the upgrade of the Karst Education Coordinator position to full-time status. Of particular importance in education and outreach were the Chesapeake Bay Headwaters Academy and the Growing Communities on Karst series of workshops. The Chesapeake Bay Headwaters Academy was sponsored by the VRUEC and organized by the Karst Education Coordinator, providing the opportunity for teachers to earn continuing education credits while learning about the protection of groundwater resources. The Growing Communities on Karst workshops will continue into future years, and focus on bringing diverse stakeholders together to learn about the expanding urban-rural interface and its relationship to karst systems.

Virginia Ground Water Festival

The first State sponsored Ground Water Festival was held in September 2000 in Harrisonburg, Virginia. Sixth grade students from Rockingham County Middle Schools attended the all day education event focusing on ground water protection in the Valley and Ridge Physiographic Province. The festival was a success due to the cooperation of a number of agencies and their volunteers. Since that time there have been festivals in all five physiographic provinces. These festivals are funded through a combination of Federal, State, and local funding. Local volunteers can be credited with continuing these festivals which promote water resource stewardship and ground water protection concepts in particular.

Ground Water Protection Program Conclusion

Ground water programs in Virginia strive to maintain the existing high water quality. The Virginia Ground Water Protection Steering Committee (GWPSC), established in 1986, continues to meet bi-monthly as a vehicle for sharing information, for directing attention to important ground water issues, and for taking the lead on ground water protection initiatives requiring an inter-agency approach. This inter-agency advisory committee is designed to stimulate, strengthen, and coordinate ground water protection activities in the Commonwealth. Ground water protection activities in the Commonwealth are as varied as the funding sources that support them.

Table 5.1- 2 Major Sources of Ground Water Contamination

Contaminant Source	Ten Highest-Priority Sources(/)	Factors Considered in Selecting a Contaminant Source	Contaminants
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications	/	(F) State GW Protection Strategy	(E)
Irrigation practices			
Pesticide applications	/	(F) State GW Protection Strategy	(A,B)
Storage and Treatment Activities			
Land application	/	(F) State GW Protection Strategy	(E)
Material stockpiles			
Storage tank (above ground)			
Storage tank (underground)	/	(F) State GW Protection Strategy	(D)
Surface impoundments	/	(F) State GW Protection Strategy	(E)
Waste piles			
Disposal Activities			
Landfills	/	(F) State GW Protection Strategy	(M) 40 CFR-App IX
Septic systems	/	(F) State GW Protection Strategy	(J)
Hazardous waste generators			
Hazardous waste sites			
Industrial facilities			
Material transfer operations			
Mining and mine drainage	/	(F) State GW Protection Strategy	(M) Acid Leachate
Pipeline and sewer lines			
Salt water intrusion	/	(F) State GW Protection Strategy	(G)
Urban runoff	/	(F) State GW Protection Strategy	(M) NPS pollutants such as fertilizers & heavy metals
Other sources (please specify)			

A-Inorganic Pesticides
B-Organic Pesticides
C-Halogenated Solvents
D-Petroleum Compounds
E-Nitrite
F-Fluoride
G-Salinity/Brine
H-Metals
I-Radionuclides
J-Bacteria
K-Protozoa
L-Viruses
M-Other

Table 5.1-3 Summary of State Ground Water Protection Programs

Programs or Activities	Check* (/)	Implementation Status	Responsible State Agency
Active SARA Title III Program	/	fully-estab.	DEQ
Ambient ground water monitoring system			
Aquifer vulnerability assessment	/	under devel.	VDCR
Aquifer mapping			
Aquifer characterization			
Comprehensive data management system			
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)			
Ground water discharge permits (VPA)	/	fully-estab.	DEQ
Ground water Best Management Practices			
Ground water legislation (Quantity)	/	fully-estab.	DEQ
Ground water classification			
Ground water quality standards	/	fully-estab.	DEQ
Interagency coordination for ground water protection initiatives	/	fully-estab.	DEQ
Nonpoint source controls	/	cont. efforts	VDCR
Pesticide State Management Plan (Generic)	/	fully estab.	VDACS
Pollution Prevention Program			
Resource Conservation and Recovery Act (RCRA) Primacy	/	fully-estab.	DEQ
Source Water Assessment Program	/	fully-estab.	VDH
State Superfund			EPA primacy
State RCRA Program incorporating more stringent requirements than RCRA Primacy			
State septic system regulations	/	fully-estab.	VDH
Underground storage tank installation requirements	/	fully-estab.	DEQ
Underground Storage Tank Remediation Fund	/	fully-estab.	DEQ
Underground Storage Tank Permit Program	/	fully-estab.	DEQ
Underground injection Control Program			EPA primacy
Well abandonment regulations	/	fully-estab.	VDH
Well Installation regulations	/	fully estab.	VDH

Table 5.1-4 Ground Water Contamination Summary

Aquifer Description Commonwealth of Virginia
Data Reporting Period January 1, 2000 - December 31, 2004

Source Type	Present in reporting area	Number of sites in area	Number of sites that are listed and/or have confirmed releases	Number with confirmed groundwater contamination	Contaminants	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of Sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL		21	21	15	(A) append 9	21	17	20	20	4
CERCLIS (non-NPL)		200+								
Voluntary Remediation		25	240	210	(A) & (B)	245	150	172		113
DOD/DOE (NPL) _ (NPL)		13	220	99	(B)	48	21	13	10	1
DOD/DOE(nonNPL)		45	78	78		43	17	13	13	0
Leaking UST & AST as of DEC 2004		21,548	21,548		petroleum hydrocarbons				2,029	19,519
RCRA Corrective Action	PERMITTED	19 facilities	19	13	40CFR APP IX	19	13	11	10	1
	UNPERMITTED Land based units closing permit to be issued, or remediating under alternate mechanism	25 facilities	25	17	40CFR APP IX	25	0	12	9	
Underground Injection										
State Sites										
Nonpoint Sources										
Other (specify)										

Source Type Abbreviations
NPL - National Priority List
CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOE - Department of Energy
DOD - Department of Defense
LUST - Leaking Underground Storage Tanks
RCRA - Resource Conservation and Recovery Act

Contaminant Type
(A) listed and characteristic hazardous waste
(B) metals, halogenated organics, POL,PCB, Pesticides

Table 5.1-5 Aquifer Monitoring Data

Hydrogeologic Setting [1] Commonwealth of Virginia

Spatial Description (optional) [2] _____

Map Available (optional) [3] _____

Data Reporting Period [4] January 1, 2000 through December 31, 2004

Monitoring Data Type	Total No. of Wells Used in the Assessment [5]	Parameter Groups	Number of Wells								
			No detection of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l No detection of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l Other parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs [10]	Parameters are detected at concentrations exceeding the MCLs [11]	Number of wells removed from service [12]	Number of wells requiring special treatment [13]	Background parameters exceed MCLs [14]
			ND [6]	Number of wells in sensitive or vulnerable areas (optional) [7]	Nitrate ≤5mg/l VOC, SOC, and other parameters not detected [8]	Number of wells in sensitive or vulnerable areas (optional) [9]					
Finished Water Quality Data from Public Water Supply Wells	2,119	VOC	2,786								
		SOC [15]	2,077								
		NO_3	3,469		6,348						
		Other [16]									

These numbers are provided by the Virginia Department of Health, Office of Drinking Water. Data is given for wells associated with mixed systems (surface and ground water) and ground water based systems. SOC data is limited due to waiver programs and no detections in systems that were monitored. VOC and SOC data may be incomplete due to optional data entry requirements in VDH field offices.
MCL exceedence information required additional work that VDH staff limitations prevented. Software modernization efforts underway at EPA may make providing this information in future reports an easier task.
Ambient data, Untreated Water Quality data from PWS, and unregulated well data is not collected or not available.